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ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
DIVISION OF WATER
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FRANKFORT KENTUCKY 40601
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February 1, 2011

Northern KY Sanitation District No. 1
Attn: Mark Wurschmidt, Interim Executive Director
1045 Eaton Dr
Ft. Wright, KY 41017

RE: Northern KY Sanitation District No. 1
AI # 2449
Church Street CSO Reduction Project

Dear Mr. Wurschmidt:

Thank you for submitting a Green Project Reserve (GPR) business case for your proposed project, funded through the Drinking Water State Revolving Fund (DWSRF). A provision of the 2011, DWSRF funding cycle requires that to the extent there are eligible project applications; states shall use 20% of its Clean Water State Revolving Fund capitalization grant for green infrastructure projects. These projects are intended to address water and energy efficiency improvements or other environmentally innovative activities. The Kentucky Division of Water (KY DOW) has reviewed the GPR business case for the Church Street CSO Reduction Project, and has found the justification to be acceptable. If the scope of the project is altered in any way to exclude the GPR eligible components, the Northern KY Sanitation District No. 1 shall submit the changes in writing to the KY DOW and receive prior approval in writing before proceeding with construction.

We look forward to working with you in finalizing your wastewater infrastructure project. If you have any questions regarding this correspondence, please contact me at (502) 564-3410, ext 4832.

Sincerely,

Greg Goode, P.E.
Kentucky Division of Water

Cc: Jim Turner, SD1
CWSRF File

GREEN COMPONENT SUPPLEMENT TO THE 2011 CWSRF AND DWSRF CALL FOR PROJECTS

During the 2011 Call for Projects held October 2009 through March 2010, the below referenced project was identified as "green" or included "green" components. In order to determine the green costs and whether or not the project is considered categorically green or whether a business case will be required, the Division of Water needs additional information.

Attached to this email is the current Green Guidance for the 2011 funding cycle. Green projects are classified as projects that address: Water Efficiency, Energy Efficiency, Green Infrastructure or Environmentally Innovative Activities. The guidance discusses each of these categories and the components or types of projects that would require a business case versus a classification of categorically green.

Please review the attached guidance and complete the below information. **In order for green merits of the project to be included as such on the 2011 Priority List, this form must be completed and returned via email to Division of Water no later than May 17, 2010.**

Questions or completed forms should be submitted to the Division of Water contacts noted below:

Clean Water SRF

Anshu Singh

Anshu.singh@ky.gov

502-564-3410 ext. 4805

Drinking Water SRF

Amanda Yeary

Amanda.yeary@ky.gov

502-564-3410 ext. 4839

Note: An itemized list of components and their related costs are all that is required at this time.

Applicant (Must be governmental entity): Sanitation District No. 1

Project Name: Church Street CSO Reduction Project

WX / SX Number (required): SX-21117125

Please provide contact information for questions relating to this form only:

Contact Name: Mark Wurschmidt

Email: mwurschmidt@sdl.org

Telephone: (859) 578-7450

1) Based on the attached guidance, do you consider your project a 100% green project?

Yes _____ No X

2) Based on the attached guidance, please categorize your green components into the identified categories and provide a listing of the green components and an estimation of related costs at this time:

a. Water Efficiency \$ _____ (total)

Breakdown of components included with related costs:

Component	Cost
_____	_____
_____	_____
_____	_____
_____	_____

b. Energy Efficiency \$ _____ (total)

Breakdown of components included with related costs:

Component	Cost
_____	_____
_____	_____
_____	_____
_____	_____

c. Green Infrastructure \$ 1,148,330 (total)

Breakdown of components included with related costs:

Component	Cost
<u>Storm Sewer Separation Directed to Wetlands</u>	<u>\$ 552,330</u>
<u>Downspout Disconnection</u>	<u>\$ 220,000</u>
<u>Green Feature (wetlands) in Open Space</u>	<u>\$ 376,000</u>
_____	_____

d. Environmentally Innovative Activities

Breakdown of components included with related costs:

Component	Cost
_____	_____
_____	_____
_____	_____
_____	_____

3) Total Project Cost related to "green" components (all categories): \$ 1,148,330

Business Case for Church Street CSO Reduction Project

When the 2.5 MGD capacity of the Banklick Creek pump station is exceeded during wet weather, overflows occur at three locations along the Banklick Creek. With approximately 74 activations in a typical year and a total overflow volume of 56 million gallons, the Church Street CSO is the largest CSO on the Banklick Creek both in terms of annual volume and activation frequency.

Approximately 152 acres are tributary to the Church Street CSO. Combined lines as well as storm sewers from separated areas drain via two large combined sewer pipes that pass through a natural drainage swale. These pipes and associated infrastructure are in poor condition, with inflow and infiltration from the swale contributing to the high rate of CSO activation. In addition, the communication of flows between the combined sewer and the swale has raised public health concerns. Several options to address the overflows at the Church Street CSO have been evaluated:

- Increase downstream pump station capacity
- A high rate treatment facility to process flows prior to discharge
- Storage of the overflow, either in line or off line
- Integrated gray and green infrastructure

Increasing the pump station capacity at Banklick Creek is infeasible at this time because it would adversely affect the downstream system, which has very little additional capacity. A high rate treatment facility is prohibitively expensive, and because it would be remotely operated, involves increased operation and maintenance costs. In line storage alone, while feasible, cannot sufficiently reduce the CSO volume and frequency. In order to reduce overflows to 18 events per year, a 1.2 MG off-line storage tank with a capital cost of \$12.5 million would be necessary. However, off-line storage does not capitalize on opportunities for green controls.

The selected integrated gray/green alternative utilizes green infrastructure technologies to reduce the required size of the gray infrastructure component while providing benefits that would not otherwise be realized under a full gray scenario. The selected integrated solution separates the storm water load from the combined system by disconnecting roof downspouts and storm water catch basins in nearby neighborhoods, and directing the storm water to a constructed biofiltration basin at the Church Street swale for detention and water quality treatment. After passing through the biofiltration basin, the collected storm water will discharge directly into the Banklick Creek via a proposed culvert crossing beneath Church Street. Hydraulic model results indicate that separation of this street load will reduce annual CSO activation frequency by 19 activations (74 to 55) and overflow volume by 57% (56 mgal reduced to 24 mgal). By directing the separate storm water through the biofiltration basin, the storm water will also be treated to reduce pollutants such as bacteria, BOD, and TSS.

Moreover, by offloading a significant portion of the runoff that is currently directed to the Church Street combined sewer system through green infrastructure, additional gray options integrated with the green infrastructure now become viable to further reduce the CSO load to Banklick Creek. In particular, in-line storage is now a viable option in concert with the green infrastructure to further reduce CSO volume. By replacing the

two parallel combined sewer pipes that run beneath the existing culvert with a single 72-inch pipe laid at a lower elevation, annual CSO activation frequency and overflow volume can be further reduced to 38 activations and 19 mgal under partial separation of the upstream combined system, and 11 activations and 4.1 mgal in a typical year under complete separation of the upstream combined system. **The total cost of the integrated solution with complete separation is estimated to be \$11.9 million. The equivalent gray off-line storage solution cost is \$16.4 million. Therefore, the integrated solution will save SD1 approximately \$4.5 million in capital cost as compared to the traditional gray solution.** Annual O&M and depreciation costs of the storage tank and associated tank dewatering pumping station (part of the gray solution) will be approximately 2% of the construction cost, therefore **SD1 is also expected to save more than \$180,000 annually by not having to construct the gray off-line storage solution.**

In addition to reducing the size of the necessary storage infrastructure relative to the gray only solution and thus making in-line storage feasible, the integrated solution offers several benefits that can translate into additional financial savings as well as improved environmental performance. First, the construction of a storm water collection and treatment system provides future capacity to address additional flows that may be generated from redevelopment within the tributary area. These flows would have otherwise remained connected to the combined system and potentially made the CSO issue worse. Second, the construction of the swale and replacement of the existing combined sewer pipe eliminates the connection that currently exists between the combined sewer system and ponded water in the bottom of the swale, thereby improving public health. Finally, the construction of the green infrastructure improves the aesthetics of the recreation area adjacent to the swale.

The integrated gray/green infrastructure solution will be implemented in a phased approach. The first phase includes three major elements:

- Downspout disconnection on over 200 homes
- Separation of inlets on five streets immediately surrounding the proposed biofiltration basin and installation of over 2,000 linear feet of separate storm sewer to direct storm water to the basin
- Construction of an approximate 3.5 acre biofiltration basin,

The construction of an observation trail surrounding the biofiltration basin to provide access for water quality monitoring and increase awareness of green infrastructure solutions and their ability to address urban infrastructure issues will be completed at the same time, but are not part of the current application for green funds.

Completion of this initial phase will allow SD1 to monitor the effectiveness of these disconnection techniques and the benefits of the storm water biofiltration basin. Future phases are planned to involve additional disconnection of downspouts and separation of street inlets from the combined system with gray infrastructure improvements as required in order to maximize the amount of runoff directed to the storm water biofiltration basin. Once all phases of this concept plan are complete, the constructed storm water biofiltration basin will have the ability to intercept runoff from the upstream drainage area that currently enters the combined system.

Two elements of this project (downspout disconnection and biofiltration basin construction) meet the requirements of a green infrastructure categorical project as laid out in the Green Project Reserve guidance document. A third element, comprising street inlet separation and conveyance pipes, is necessary to divert storm water to the biofiltration basin. Finally, the upgrade of the existing parallel sewers to a single 72 inch line at a lower diversion elevation further reduces overflows through in-line storage and the elimination of communication of flows between the existing swale area and the combined system. Thus the current project utilizes conventional and green technologies to produce an innovative, overall green solution to the Church Street CSO overflow problem.

Greg,

When you were in Northern Kentucky last week with Buddy Griffin for the final inspection of the Banklick Stabilization project, you asked me to submit additional information related to the "green business case" for SD1's Church Street project. The original green business case for this project that SD1 submitted to Amanda Yeary on January 11, 2011 included the following:

- *Construction of an approximate 3.5 acre biofiltration basin,*

The construction of an observation trail surrounding the biofiltration basin to provide access for water quality monitoring and increase awareness of green infrastructure solutions and their ability to address urban infrastructure issues will be completed at the same time, but are not part of the current application for green funds.

The text below was taken from the engineering design request for proposal (RFP) for the Church Street project (SD1's deadline for receiving these proposals is February 3, 2011):

This basin shall be designed to achieve the following goals:

- *Be sized to receive all of the storm water runoff from the CSO boundary area as shown in Map B-7,*
- *Capture and treat the first 0.80" of storm water runoff in order to achieve at least a 50% reduction in bacteria,*
- *Remove other pollutants such as total suspended solids and nutrients including nitrogen and phosphorus,*
- *Reduce storm water volume and peak flows into Banklick Creek. The Consultant shall evaluate the appropriate level of volume and peak flow reduction taking into account such principles as $Q_{critical}$, SD1's current storm water rules and regulations, and what the existing contours and lay of the land will accommodate. SD1 will provide the $Q_{critical}$ value to consider in the basin sizing. It may not be appropriate to size the new basin to achieve $Q_{critical}$, however, it should be considered by the Consultant in their evaluation.*
- *Limit the amount of standing water contained in the basin to address nuisance wildlife and mosquitoes.*

The Consultant shall evaluate a minimum of three alternatives for the configuration and type of biofiltration basin to be selected. The biofiltration basin shall include access to the basin for proper observation, maintenance, and sampling. A boardwalk or trail that will be used by SD1 and could also be used in the future by residents or pedestrians is acceptable. Design of the pedestrian trail outside of the limits of the basin is not included in this scope of work.

Please let us know if this additional information is sufficient for you to complete your review of the green business case for the Church Street project.